# Refine Search

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| L7 | l5 and L6 | 0 | L7 |
| L6 | vector | 342597 | L6 |
| L5 | l3 and L4 | 13 | L5 |
| L4 | navigation | 91332 | L4 |
| L3 | l1 and L2 | 100 | L3 |
| L2 | toll near vehicle | 598 | L2 |
| L1 | exit and entrance | 106598 | L1 |

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**Search Results -**

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| L3 and L4 | 13 |

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| L4 | navigation | 91332 | L4 |
| L3 | l1 and L2 | 100 | L3 |
| L2 | toll near vehicle | 598 | L2 |
| L1 | exit and entrance | 106598 | L1 |

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**Search Results -**

| Terms | Documents |
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| L3 and L4 | 17 |

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| L5 | l3 and L4 | 17 | L5 |
| L4 | GPS | 415597 | L4 |
| L3 | l1 and L2 | 32 | L3 |
| L2 | road adj segment | 899 | L2 |
| L1 | digital adj road adj map | 242 | L1 |

END OF SEARCH HISTORY

L9: Entry 2 of 2 File: USPT Apr 16, 1996

DOCUMENT-IDENTIFIER: US 5508917 A
** See image for Certificate of Correction **
TITLE: Vehicle guidance system using beacon transmissions of destination data

Brief Summary Text (5):
Furthermore, a map-supported locating and navigation system "Travelpilot" is known, wherein the entire road system of Germany is stored on a compact disc and is available to the locating and navigation system. However, it has been found that the internal memory of the system needs to be quite extensive, or that a relatively expensive CD device is required if a great many destinations must be stored by their coordinates. Taking into consideration that the memory then needs to be present in practically every vehicle, the result is a very extensive technical outlay with correspondingly high costs.

Brief Summary Text (11):
Since the transmission of a guidance vector chain is sufficient at a greater distance from the destination, the output of the route to be driven can be designed to be very simple. The output of simple route symbols in particular is possible. A map display in color is particularly advantageous for improving overall clarity.

Brief Summary Text (12):
Because the range of the beacon transmitting/receiving device is relatively short, individual destination guidance in areas without a beacon infrastructure takes place by means of compound locating in a locating and navigation system. The transmission of the position coordinates of an adjacent beacon is particularly helpful for arranging the navigation system or for correcting the coupled positional data. By means of transmitting the coordinates of the location of the beacon, it is possible to determine the position exactly to within a few meters.

Detailed Description Text (2):
Basically, the vehicle and destination guidance system has two component devices: a vehicle device and a stationary beacon device. The block diagram of the vehicle device in accordance with FIG. 1 shows essential functional parts of the invention. An input unit 11 is connected with the control unit 12, which has a destination memory 17 for place names and their coordinates. The control unit 12 is connected with a display 13 for the output of traffic guidance information. There are also connections with the car radio, particularly to the memory of the receiver section of the traffic message channels (TMC) and for audio output 16 to the LF amplifier of the car radio. A locating and navigation system 21 has a compass, wheel sensors, a device 15 for compound locating and a device 14 for map matching for the coordination detection by means of map comparison. Furthermore there is a map memory 20 for storing map data transmitted by the beacon. The map matching device 14 is connected with the map memory 20. A connection with the display 13 is provided for displaying the map data and the position of the vehicle. The map matching device 14 is also connected with the control unit 12. Another output of the control unit 12 leads to a further intermediate memory 18 for received guide vector chains.

Detailed Description Text (5):
A control unit 36 is connected on the one side with the transmitting-receiving unit 30 and on the other with various memories, such as the guide vector chain memory 37 and the memory 38 for street maps in the near and far areas. The control unit 36 furthermore is connected via an interface 35 with a central computer, not shown, by means of which a plurality of beacon devices can be controlled.

Detailed Description Text (11):
The vehicle and destination guidance system has a modularly constructed vehicle device comprising various components of the location and navigation system (optional), an input and output device for destinations, street maps and/or indications for the direction of travel in the form of arrow symbols or audible output. It is considered to be particularly advantageous that the input of the destination (place and street) is performed in plain language, wherein the coordinates for the desired street are taken from the memory of the beacon device. The memory of the beacon device is comparatively large, while the vehicle memory is designed relatively small and is therefore inexpensive to manufacture. To save memory space, a link with the memory of a car radio is provided. The use of the memory of the device for decoding traffic message channels (TMC) is particularly advantageous, because place names have already been stored therein. It is only necessary to store the coordinates of centers of locations which are part of the place names.

Detailed Description Text (12):
The vehicle and destination guidance system, while preserving anonymity to a large degree, is used to assist the driver of a vehicle in searching for his destination. In addition to street maps or route suggestions, it contains information regarding the state of traffic, backups, detours, icy roads, etc. The system can also be used for the automatic processing of entry permits, deduction of parking fees or tolls for roads or places requiring tolls, because the vehicles can be detected through induction coils embedded in the road and can be individually addressed by means of the beacon devices.

Detailed Description Text (20):
5. Route tree (collective guide vector chain), if necessary arranged by types of vehicles,

Detailed Description Text (22):
The vehicle device now checks to determine whether the coordinates of the center of the location (OMK) of Hildesheim are identical with those of the beacon location (Anderten). Because this is not the case, the vehicle device searches the route tree received from the beacon for the guide vector chain associated with the OMK of Hildesheim, A7 in the example, and represents it on the display 13. If desired, a complete road map can be shown. The map can be displayed at various scales.

Detailed Description Text (31):
The guide vector chain which leads to the destination area in which the street "Blauer Kamp" is located is now determined in the vehicle device with the aid of this coordinate pair from the route tree and is displayed. If the destination is located in the exactly displayed near range, the guide vector chain leads directly to the selected street (for example "Blauer Kamp"). If no further information, such as house number or hotel, is available, it is provided to indicate the respective point of the street which lies closest to the travel route.

Detailed Description Text (32):
If additional beacons are located on the way to the destination, it is also possible to transmit a guide vector chain as far as the beacon which is located closest to the destination "Blauer Kamp".

Detailed Description Text (39):

Based on the coordinate pair, it is possible to pick out the sequence of road sections (guide vector chain) leading in the direction to the destination in the beacon and transmit it to the vehicle. Because the beacon located in the vicinity of the vehicle knows the coordinates of the destination, it can send a road map to the vehicle which represents the momentary position of the vehicle and which is continuously changed as long as the vehicle moves in the direction toward the destination. When the vehicle comes into the range of a further beacon, this beacon takes over the guidance function in the same manner and guides the vehicle on to the next beacon, and so on until the vehicle has reached its destination. These guide vector chains make possible the successive guidance of the vehicle as far as the destination. If the vehicle reaches an area that does not have a sufficient beacon infrastructure, continued navigation is performed with the location and navigation system 21 with the known device 15 for compound locating. Because within the range of a beacon its coordinates approximately correspond to the coordinates of the position of the vehicle, these position data can be compared with the position data coupled in by the location and navigation system 21 and corrected, if needed. In this way, the error of the location and navigation system 21 is reduced.

Detailed Description Text (48):
Upon entrance of a vehicle into a toll area, the OBU of the vehicle receives a signal from a first transmitter, generally mounted on a first overhead sign assembly or beacon, which activates a demodulator. The received signal contains data regarding the station code, the amount of toll and other key words for statistical evaluation. After checking validity, the "on-board unit" is activated. The OBU decodes the information received, deducts for example the amount of toll for the road to be travelled from a toll card, which can be inserted, for example as a credit card, into the toll device and prepares the acknowledgement report. Then the OBU returns to the stand-by mode.

CLAIMS:

1. A vehicle and destination guidance system with a vehicle device located in a vehicle having a data input device, a data output device, a destination memory for place names, with a data memory for road maps or guide vectors and with a first transmitting/receiving unit, and with at least one stationary device of a beacon located outside of the vehicle having a second transmitting/receiving unit which is in communication at least temporarily with the first transmitting/receiving unit located in the vehicle and which has a further data memory, in which at least one of a road map and guide vectors are stored which can be transmitted to the vehicle device, wherein

a. the data input device (11) of the vehicle device is designed for entering with alphanumeric characters at least one of the place name and the street name of a selected destination,

b. the destination memory (17) contains coordinates of centers (OMK) of the destinations which can be input,

c. the vehicle device has means (11) through which a destination vector can be determined from the vehicle position and the coordinates of the center (OMK) of the destination and can be output in a display (13), and means to transmit data to the beacon device for identifying the destination,

d. the beacon device includes means responsive to said selected destination received from the vehicle device to transmit to the vehicle as it passes the center coordinates (OMK) of at least one of the places associated with the beacon, and route tree with guide vector chains of the long distance route net,

e. the vehicle device has means (12) to compare the received center coordinares

with the destination coordinates for (a) in case of a deviation, providing a guide vector to the nearest beacon located in the direction toward the destination, and (b) in case of agreement, controlling the beacon device to transmit portions of at least one of the road map of the destination area and guide vectors to the destination to the vehicle device.

5. A vehicle and destination guidance system in accordance with claim 1,

wherein, on demand of a vehicle, a sequence of road sections (guide vector chain) containing the travel route in the direction toward the destination can be transmitted by the beacon to the vehicle.

8. A vehicle and destination guidance system in accordance with claim 7,

wherein at least one of the travel route and the guide vector chain is shown in color.

9. A vehicle and destination guidance system in accordance with claim 1,

wherein a locating and navigation device is provided in the vehicle, and

correction of the compound navigation can be made on the basis of the coordinates received from the beacon.

12. A vehicle and destination guidance system in accordance with claim 10,

wherein a credit card can be inserted into the device of the vehicle, from which the toll can be deducted.

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L5: Entry 17 of 17 File: USPT Aug 3, 1999

DOCUMENT-IDENTIFIER: US 5933100 A
TITLE: Automobile navigation system with dynamic traffic data

Abstract Text (1):
A system located in an automobile provides personalized traffic information nd route planning capabilities. This system uses equipment which is becoming standard in automobiles, such as on-board navigation systems and cellular telephones. On-board navigation systems use global positioning system (GPS) satellites to position the automobile with respect to streets in a map database. As the automobile moves, the navigation system updates the location. A central database includes travel time information for each street segment and transition between street segments in the map database. Based upon the travel time information in the database, a route from a current location to a desired destination, or series of destinations, can be planned in order to have a minimum travel time. The route can be provided to the on-board navigation system, which then directs the driver in traveling the route. The cellular telephone in the automobile can be used for communicating with the central database to obtain travel times for route planning. In order to provide dynamic travel time information to the central database, each automobile in the system operates as a data collector. As various street segments are traversed, the travel time for each segment is recorded. The travel time and street segment information is periodically transferred to the central database through the cellular telephone connection. The central database then combines the travel time data from each automobile to create accurate travel time data for each street segment.

Brief Summary Text (7):
In addition to traffic report information, systems have been and are being developed for providing route planning information and navigational assistance to drivers. One such system is illustrated in U.S. Pat. No. 5,272,638, assigned to Texas Instruments Incorporated. This system includes a digital road map database providing information about road segments, intersections, and travel times for road segments. Information in the database is used to plan routes having minimal travel time from one location to another. More efficient route planning is obtained by using a route hierarchy of local areas around the starting and ending locations, major thoroughfares between local areas, and major freeways for longer travel distances. Preferably, vehicle location information can be determined using satellite systems or some other positioning method. Instructions can then be provided audibly or visually to the driver when turns are necessary in the travel plan. This patent provides suggestions for a process for determining a route based upon the travel destination and the travel times stored in the database. However, the patent does not describe how the information in the database can be obtained. It suggests that dynamic traffic information can be obtained through a traffic interface. A traffic interface may receive digital broadcast over radio sidebands, or from centralized cellular phone systems containing information on traffic obstacles such as accidents and amounts of the resulting delays. However, no suggestion is made as to how such dynamic information is collected or organized for transfer to the system in the vehicle. Therefore, a need exists for a system which provides for collection, organization and dissemination of traffic information

which can be used in a route planning and navigation system.

Brief Summary Text (12):
The present invention provides a system for personalized traffic reports and route planning using dynamically updated travel information in conjunction with equipment currently found in automobiles. Many new automobiles include as standard equipment an on-board navigation system. Such a system uses static travel time data in connection with street data to provide navigational information to the operator of the automobile. Typically, GPS satellites are used to locate the automobile within the street system of the navigation system. A map of the surrounding streets can then be displayed to the operator. Sometimes, such systems also include route planning information. If not already included in the on-board navigation system, in one embodiment, the present invention would include a route planning system which uses the travel time information to determine a route having minimum travel time, or meeting other criteria.

Detailed Description Text (2):
As illustrated in FIG. 1, the route planning and navigation system of the present invention includes a vehicle navigation system 1 and a central database 2. The vehicle navigation system 1 is located on each automobile within the system. The vehicle navigation system 1 includes an on-board navigation system 10, which can include a standard system currently found on some automobiles. The on-board navigation system 10, includes a map database having data relating to street segments and intersections between street segments. The on-board navigation system 10 also includes sensors for receiving transmissions from GPS satellites 3. An appropriately designed processor locates the automobile, using the satellite information, on the street segments in the map database. The on-board navigation system 10 can provide information to the operator relating to the current position and a map of surrounding streets. The navigation system can also indicate when turns are to be made in accordance with a particular route.

CLAIMS:

1. A navigational system comprising:

a central database including:

a central memory storing a plurality of current travel times corresponding to actual travel times for vehicles traversing particular street segments which are received at the central database from vehicle transmitters;

a route planner having an input for receiving starting and ending locations and having access to the central memory and an output indicating a travel route from the starting and ending locations having a minimum travel time based upon the current travel times; and

a central database transmitter for transmitting a individual travel route to each of a plurality of vehicle navigation systems; and

wherein each vehicle navigation system is associated with a respective one of a plurality of vehicles and comprises:

a map database having data representing locations of street segments;

a positioning device for receiving GPS satellite signals and determining a location of the vehicle in relation to street segments and determining when the vehicle has traversed street segments;

a timer for determining a vehicle travel time for traversal of street segments;

a storage device for storing traversed street segments and corresponding vehicle travel times;

a vehicle transmitter for communicating the stored traversed street segments and corresponding vehicle travel times to the central database;

a receiver for receiving the travel route transmitted by the central database;

a vehicle memory storing the travel route.

17. A navigational system comprising:

a central database including:

a central memory storing a plurality of current travel times corresponding to actual travel times for vehicles traversing particular street segments which are received at the central database from vehicle transmitters; and

a central database transmitter for transmitting the plurality current travel times to a plurality of vehicle navigation systems; and

wherein each vehicle navigation system is associated with a respective one of a plurality of vehicles and comprises:

a map database having data representing locations of street segments;

a positioning device for receiving GPS satellite signals and determining a location of the vehicle in relation to street segments and determining when the vehicle has traversed street segments;

a timer for determining a vehicle travel time for traversal of street segments;

a storage device for storing traversed street segments and corresponding vehicle travel times;

a vehicle transmitter for communicating the stored traversed street segments and corresponding vehicle travel times to the central database;

a receiver for receiving the current travel times transmitted by the central database;

a vehicle memory storing the travel route; and

a route planner having an input for receiving starting and ending locations and having access to the vehicle memory and an output indicating a travel route from the starting and ending locations having a minimum travel time based upon the current travel times stored in the vehicle memory.